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BLAKELY SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD, SEVENTH FLOOR
LOS ANGELES, CA 90025

EXAMINER

STAHL, MICHAEL J

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 05/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/745,033

Applicant(s)

JIANG ET AL.

Examiner

Mike Stahl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 60-112 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 60-112 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 20 December 2000 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7. 6) ☐ Other: _____

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This office action is in response to the amendment filed March 4, 2003. The changes to the claims have been entered. Claims 60-112 are pending. The objection to claims 85 and 92 made in the previous action is withdrawn in view of the amendment.

Information Disclosure Statement

The references submitted March 4, 2003 have been considered. Initialed copies of form PTO-1449 are attached.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 60-64, 67-77, 80-85, 87-91, 93-100, 102-103, and 105-112 are rejected under 35 U.S.C. 102(e) as being anticipated by Scharf et al. (US 6369924, previously cited by applicant).

Scharf discloses an optical module (figs. 2-10) comprising first and second optoelectronic devices 44 and 45 for coupling light into or receiving light out of fibers, first and second printed circuit boards (PCBs) 36 and 37 which are coupled to the optoelectronic devices and parallel to their optical axes, and which include pins 40 and 41, a shielded housing 30 spaced around the first and second PCBs to reduce EMI, and a base coupled to the shielded housing perpendicular

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to the PCBs (in this case the base is a part of the housing). The Scharf module thus anticipates independent claims 60, 83, and 94. As to independent claim 105, Scharf teaches that the housing **30** may be conductive (col. 6 lines 13-15) and that a forward portion **30a** may be made of die-cast metal (col. 5 lines 50-52). Accordingly, it is asserted that the entire housing **30** may be metallic. The Scharf module as described above also meets the requirements of claims 74, 95, 100, 103, and 111.

As to claims 61, 75, 93, and 99, the first and second optoelectronic devices have terminals which are coupled to the upper and lower sides of their respective PCBs (fig. 6).

As to claims 62, 63, 80, 81, 87, 88, 97, and 98, the PCBs **36** and **37** are vertical circuit boards perpendicular to a horizontal plane, the optical axes of the devices are parallel to the horizontal plane, and the boards are perpendicular to a system circuit board **22** when the module **26** is mounted thereto. Regarding claim 64, the pins **40** of the first PCB **36** couple to the system circuit board **22** as shown in fig. 1.

As to claims 67, 68, 106, and 107, the housing **30** is electrically coupled to ground on the system circuit board **22** (col. 6 lines 15-18). The system circuit board may be regarded as a system chassis relative to the module **25**. As to claims 69 and 108, it is asserted that grounding the housing by coupling to a grounded trace on the first PCB **36** is within the scope of the Scharf disclosure.

Regarding claims 70, 71, 76, 77, 109, and 110, the base of the housing has openings from which the pins **40/41** of the PCBs extend.

As to claims 82, 84, 85, and 96, the housing includes an internal shield **35**.

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As to claims 72 and 89, the front portion **30a** of the Scharf module constitutes a nose which receives a fiber connector **23** and aligns a pair of fibers with their associated devices **44** and **45**. As to claims 73 and 90, the front portion **30a** may be made of die-cast metal and provides shielding accordingly.

As to claims 91, 102, and 112, the first and second devices **44** and **45** are an emitter and a photodetector, respectively, and the module is a transceiver module.

Claims 94, 96, 97, 105-107, and 109-112 are rejected under 35 U.S.C. 102(e) as being anticipated by Henningsson et al. (US 6072613, previously cited by applicant).

Henningsson discloses a fiber optic module comprising a first and second circuit board. Note that the PCB **10** may actually comprise two distinct PCBs sandwiching a metallic layer (col. 3 lines 15-18). The PCBs have pins **14** and are coupled to terminals of first and second optoelectronic devices, i.e. a transmitter and a receiver, carried in a device housing **6** (col. 2 lines 41-67). A metallic shielded housing **2** is spaced around the first and second PCBs. The PCBs are mutually parallel and are also parallel with the optical axes of the transmitter and receiver components. The Henningsson module therefore satisfies claim 105, and the method of manufacturing it satisfies claim 94.

As to claim 96, the metal layer **50** acts as an internal shield between the first and second PCBs (figs. 4-5; col. 4 lines 8-12).

As to claim 97, the first and second PCBs are vertical PCBs perpendicular to a horizontal plane, depending on the orientation of the module. "Vertical" and "horizontal" are relative terms in this context.

As to claim 106, the metallic shielded housing 2 is electrically coupled to ground (col. 2 lines 3-9). As to claim 107, the housing is grounded to a mother board 4 which may be regarded as a system chassis relative to the module.

Regarding claims 109 and 110, the housing 2 includes a base 16 having openings for pins 14 (col. 2 lines 62-67).

As to claim 111, although Henningsson mentions that the first and second devices may be integrated to enable use of a single fiber, it appears that this structure is merely optional. Accordingly it is asserted that using two fibers is still within the scope of the reference. As to claim 112, the module is a transceiver module.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 66, 78, 79, 86, and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scharf et al. (cited above).

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As to claim 78, it would have been obvious to a skilled person to alternatively use a pair of fiber connectors in the Scharf arrangement, since in some situations it would be beneficial to route the transmitting and receiving fibers independently. As to claim 79, the front housing portion **30a** acting as the nose is made of metal and provides shielding as noted above.

As to claims 66 and 86, Scharf is silent as to the existence of a lens for coupling light between the fibers and the optoelectronic devices **44** and **45**. Even if there are not lenses built into these devices as implemented in the Scharf module, it nevertheless would have been obvious to a skilled person to provide such lenses since it is routine to use lenses to optimize the coupling of light between devices and fibers.

As to claim 92, Scharf describes the emitter **44** only as a laser. It would have been obvious to a person of ordinary skill in the art to specifically choose a vertical cavity laser since this type of laser is known to be relatively efficient and stable, and since it can be mounted more easily in its package than edge-emitting types of lasers.

Claims 60-66, 70-99, 101, 102, and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf (US 6024500) in view of Benzoni (EP 0652696 A1).

Wolf discloses a fiber optic module **10** comprising first and second optoelectronic devices **22** and **32** to couple light into or out of first and second optical fibers, and first and second printed circuit boards **21** and **31** which are coupled to the first and second devices and are parallel to their respective optical axes, and which include pins **25** and **35** inserted through openings in a base **14**. Both circuit boards **21** and **31** are perpendicular to the base **14**. The module also includes a housing **11** which is disclosed as a dielectric material, generally plastic.

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The housing is generally spaced around the printed circuit boards at least in that the top portion of the housing is spaced from the PCBs. Moreover it is considered inherent that there is at least a slight space between each PCB and its associated sidewall by virtue of the pin-in-hole mounting method mentioned at col. 2 lines 26-30. The Wolf module thus meets every limitation of independent claims 60, 83, and 94 except that its housing is not specifically designed to provide EMI shielding.

Benzoni also discloses a fiber optic module having a dielectric housing, but teaches that portions of the housing may be coated with a conductive material in order to provide EMI shielding (abstract; col. 3 line 53 – col. 4 line 50). Benzoni further teaches that this approach avoids known problems with forming and assembling metal housings (background).

Accordingly, it would have been obvious to a person having ordinary skill in the art to modify the Wolf module by simply providing an appropriate conductive coating in the manner taught by Benzoni to provide shielding from external EMI sources. The proposed modification would have satisfied independent claims 60, 83 and 94 as well as dependent claims 70-71, 74, 76-77 and 95.

As to claims 61, 75, 93, and 99, figs. 2 and 3 appear to depict terminals along both sides of each optoelectronic device **22** and **32**, with some terminals of each device being coupled to the upper side of their respective circuit boards **21** and **31** and other terminals being coupled to the opposite (lower) side of the boards. As to claims 62, 63, 80, 81, 87, 88, 97, and 98, the circuit boards **21** and **31** are vertical circuit boards perpendicular to a horizontal plane, the optical axes of the devices are parallel to the horizontal plane, and the boards are perpendicular to a system circuit board **15** when the module **10** is mounted thereto. Regarding claim 64, the pins **25** of the

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first circuit board couple to the system board **15** (col. 2 lines 21-24). As to claim 65, although Wolf does not show a connector on the system board **15** for pins **25**, it would have been obvious to provide such a connector since it would be impractical to perform a one-by-one electrical connection of the pins to the system board circuitry when there is an appreciable number of pins.

As to claim 67, it would have been obvious to a skilled person to ground the shielded housing of the proposed modification since it is well known in the art to ground housings which are used for shielding purposes. As to claim 68, it would further have been obvious to couple the housing to ground through a system chassis since chassis themselves are typically grounded and this would simplify the electrical grounding connection. As to claim 69, it would have been obvious to couple the housing to ground through a trace on the circuit board since the circuit boards themselves are frequently provided with a ground connection and again, the electrical grounding connection for the housing would be simplified since the housing already contains the circuit board.

Regarding claims 82, 84-85, and 96, Benzoni discloses an internal shield **52** which is used to prevent crosstalk between a transmitter component **72** and a receiver component **76**. The shield may extend between the transmitter and receiver when they are mounted on separate substrates. Since Wolf also uses a transmitter and a receiver mounted on separate circuit boards, it would have been obvious to a skilled worker to provide an internal shield between the boards as taught by Benzoni in order to reduce interference between them.

As to claims 66 and 86, Wolf indicates that the laser module **22** and the photodetector module **32** typically include lenses (col. 1 line 66 – col. 2 line 2). As to claims 91 and 102, device **22** is an emitter and device **32** is a receiver. Regarding claim 92, although Wolf cites an

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edge emitting laser in the exemplary embodiment, it is noted that other laser types are contemplated (col. 2 lines 31-34). It would have been obvious to a practitioner of the art to specifically choose a VCSEL as the laser because it is known that VCSELs have comparatively high efficiencies.

As to claims 72, 78, and 89, Wolf discloses individual noses **23** and **33** for aligning fibers with the laser module **22** and the photodetector module **32**. It appears that a common nose to handle both fiber connectors simultaneously is within the scope of the Wolf disclosure. As to claims 73, 79, and 90, it would have been obvious to a skilled artisan to provide the nose with shielding since the nose constitutes an additional entry point for external EMI.

As to claims 101 and 104, the shielded housing in the proposed modification comprises a metal plated plastic housing.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

Applicant's arguments regarding the previously applied Chen et al. reference (US 5337396) are generally persuasive. Applicant amended independent claim 60 to recite a base perpendicular to the printed circuit board. The PCB in Chen is clearly parallel to the base, and Chen offers no motivation or suggestion to orient the PCB perpendicular to the base. As to claim 94, applicant argued that substantial modifications to the Chen module would be required to accommodate two PCBs as proposed in the earlier rejection. The examiner agrees that Chen would have to be heavily modified to come into compliance with claim 94, to the extent that a skilled person might not find it obvious to carry out such modifications. Accordingly, all rejections under Chen have been withdrawn.

Applicant's arguments concerning the previous rejections under Wolf in view of Benzoni are not persuasive. Applicant initially argued that independent claims 60, 83, and 94 were amended to essentially recite a shielded housing spaced from the PCB, and notes that in Wolf the PCBs are mounted to the sidewalls of the package. However, the examiner notes that Wolf does not state whether the PCBs are themselves in direct contact with the housing. Wolf merely states that the PCBs may be mounted to the sidewalls by a pin-in-hole technique (col. 2 lines 26-30). Therefore it is possible that the PCBs are at least slightly spaced from the sidewalls. Moreover, the housing includes more than just the sidewalls, so major portions of the housing other than sidewalls are spaced from the PCBs in any case.

Applicant also argued that Wolf teaches away from coating the housing with a conductive material (as proposed in the rejection, according to the teachings of Benzoni), since

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Wolf seeks to avoid shorting the PCBs to a conductive shielded housing. The examiner notes that Wolf does not provide any specific reason for using a plastic housing, nor any indication that he is concerned about shorting the PCBs to the housing or that shorting would even be a problem given the pin-in-hole mounting arrangement. Furthermore, coating the Wolf housing to provide shielding would not necessarily present a problem with shorting, since Benzoni teaches that it is not necessary to coat both sides of the housing to provide effective shielding (col. 4 lines 28-39). Accordingly a skilled person would have recognized that coating only the outer surfaces of the Wolf housing would be sufficient, in which case the inner surfaces would still be non-conductive.

Lastly, applicant quoted a portion of Wolf stating that Wolf's package "conforms to requirements for the next generation transceiver package without requiring new components or new processes" and essentially argued that it would not be obvious to make the proposed modifications to Wolf since the Wolf module already accomplishes effective shielding. The examiner notes that the "requirements" Wolf refers to relate to the package width and spacing between the optical axes (col. 1 lines 18-24; col. 3 lines 5-17). Wolf does not state any requirements for shielding or crosstalk reduction. While mounting the PCBs to the sidewalls does reduce crosstalk, it does not necessarily eliminate the crosstalk completely, nor does it provide shielding from EMI sources outside the housing. Wolf does not indicate that further shielding would be unnecessary, "overkill", or disadvantageous.

As to claims 61, 75, 93, and 99, applicant argued that Wolf appears to disclose terminals mounted on the same side of the PCB, and that the subject claims do not recite "upper" or

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“lower” sides. In making the rejection, the examiner was referring to the upper side and lower side of the PCBs, with the lower side being the side which is closer to the base 14 and the upper side being the side which is farther from the base. The examiner acknowledges that the subject claims do not use “upper” and “lower” terminology, but they do recite opposite sides. Upper and lower sides are opposite. Applicant is advised that these claims may perhaps be more precisely phrased in terms of opposite major surfaces of the PCBs instead of opposite sides, since in Wolf the illustrated terminals are clearly not on opposite major surfaces of their respective PCBs.

As to claims 82, 84, 85, and 96, applicant contended that it would not be obvious to provide an internal EMI shield in Wolf since Wolf’s arrangement already provides reduced crosstalk, and since substantial modification would be required to provide the Wolf housing with supports for the particular internal shield taught by Benzoni. The examiner holds that the Wolf module would benefit from additional shielding as explained above. Although the crosstalk may be reduced as a result of the sidewall PCB mounting, there may still be crosstalk which could be advantageously further reduced or eliminated by using an internal shield. As to Benzoni’s specific implementation of an internal shield, it is noted that a skilled artisan would realize that it is not necessary to use the exact same implementation in the Wolf module to achieve similar results. For example, the internal shield could be fabricated integrally with the Wolf housing and later coated with a metallic material. This would not be a substantial modification.

As to claim 90, applicant argued that Wolf’s originally disclosed housing is made of plastic, and any integral nose portion would therefore also be made of plastic and have no EMI shielding ability. Applicant further argued that Benzoni does not suggest that the receptacle 58 requires shielding. The examiner contends that Benzoni’s failure to mention EMI entering

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through the receptacle does not mean that EMI cannot enter through the receptacle. Moreover, the Wolf housing obviously does not have a nose structure identical to that of Benzoni. A person skilled in the art would know that any opening which is not shielded presents an ingress point for EMI. Therefore it would be obvious to such a person to provide shielding for the nose of the Wolf housing as noted in the rejection above.

Conclusion

Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

The references made of record and not relied upon is considered pertinent to applicant's disclosure. US 2001/0024551 A1 and US 2002/0028049 A1 are not available as prior art but disclose subject matter related to the present application.

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Any inquiry concerning this communication should be directed to Mike Stahl at (703) 305-1520. Official communications eligible for submission by facsimile may be faxed to (703) 308-7724 or (703) 308-7722. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at (703) 308-0956 or to the technical support staff supervisor at (703) 308-3072.

MJS

Michael J. Stahl
Patent Examiner
Art Unit 2874

May 17, 2003

Rodney Bovernick
Supervisory Patent Examiner
Technology Center 2800